

**MULTI-BEAM AND MULTI-BAND ANTENNA SYSTEM FOR  
COMMUNICATION SATELLITES**

**ABSTRACT OF THE DISCLOSURE**

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An antenna system includes a reflector having a modified-paraboloid shape; and a multi-beam, multi-band feed array located at a focal point of the reflector so that the antenna system forms a multiple congruent beams that are contiguous. The system has a single reflector with non-frequency selective surface. The reflector is sized to produce a required beam size at K-band frequencies and is oversized at EHF-band frequencies. The synthesized reflector surface is moderately shaped and disproportionately broadens EHF-band and Ka-band beams compared to K-band beams. The synthesized reflector surface forms multiple beams each having a 0.5-degree diameter at K-band, Ka-band, and EHF band. The multi-beam, multi-band feed array includes a number of high-efficiency, multi-mode circular horns that operate in focused mode at K-band and defocused mode at Ka-band and EHF-band by employing "frequency-dependent" design for the horns.

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